Session on heat exchange during change of aggregate state of matter. 96-3-23/26

of the Acad.Sci. Ukrainian SSR considered the study of the process of heat exchange and the hydro-dynamics of flow of a film of condensate. Cand.Tech.Sci. O.A. Kremnev, of the Institute of Thermal Engineering of the Acad.Sci. Ukrainian SSR gave the results of an experimental investigation of heat and mass exchange in models of air, and water coolers used in deep mines. Cand.Tech.Sci. K.I. Reznikovich reported on a theoretical solution of the problem of calculating the parameters of a cooled steam gas mixture. Engineer A.L. Satanovskiy reported on 'Heat exchange during air-water evaporative cooling of equipment'. Engineer L.I. Gel'man of the Central Boiler Turbine Institute reported about investigations on heat transfer during condensation of mercury vapour on a steel wall. Dotsent V.F. Yanchenko of the Ural Polytechnical Institute, Cand.Tech.Sci. O.A. Kremnev, Dr.Tech.Sci. L.D. Berman and V.A. Smirnov of the Power Institute Acad.Sci. Ukrainian SSR contributed to the discussion. The session noted the need for further development of investigations of combined processes of heat and mass exchange; further development of study of heat exchange during change of aggregate conditions of promising new working substances; a profound study of the relationships and mechanism of the process of heat exchange and the production of data for practical calculations, and recommendations for the design of new power plant. The session directed the

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Session on heat exchange during change of aggregate state of matter. 96-3-23/26

attention of the Acad.Sci. U.S.S.R. and Gosplan U.S.S.R. to the need for rapid study of the physical properties of new working substances. It was decided to call a session devoted to convective heat exchange in uniform media in Leningrad, in 1959.

AVAILABLE: Library of Congress.

Card 7/7

SOV/81-59-16-57311

Translation from: Referativnyy zhurnal. Khimiya, 1959, Nr 16, p 245 (USSR)

AUTHORS: Kutateladze, S.S., Moskvicheva, V.N.

TITLE: The Application of Gammascopy for Studying the Hydrodynamic Conditions of the Liquid-Liquid System

PERIODICAL: V sb.: Teplotekhn. i gidrodinamika. Vol 4. Moscow-Leningrad, Gosenergoizdat, 1958, pp 12-15

ABSTRACT: The structure of flows has been studied by means of $\gamma$-rays at the passage of a lighter liquid through a heavier liquid in the water-mercury system in a column with perforated plate. The presence of complex changes in the structure of the flow has been noted in the experiments, when the lighter liquid reaches a certain motion speed: first, mercury is split into small drops which are suspended in the water flow and later on a stronger dispersion of mercury is observed and its removal from the column. It has been noted that the changes in the structure of the flow and the degree of their stability are connected with the stability of the surface film of the heavier phase and consequently with the presence in the system of surface-active substances and finely-dispersed suspended matter.

V. Gertsovskiy.

Card 1/1

SOV/89S-58-5-4/4

AUTHORS: Kutateladze, S. S., Borishanskiy, V. M., Novikov, I. I., ~~Fedynskiy, O. S.~~

TITLE: Supplementary Table: "Liquid Metallic Heat Carriers" (Prilozheniya: Zhidkometallicheskiye teplonositeli)

PERIODICAL: Atomnaya energiya, 1958, Supplement 5, Inserted Between pp 108 and 109 (USSR)

ABSTRACT: This is a supplement to table 12.1 (pp 172-173) and the explanation of the positions 1 - 33 on the drawing 12.1 (pp 177) in connection with the paper published in Atomnaya energiya, 1958, Supplement Nr 2. The table contains data on physical properties of metallic heat carriers. There is 1 table.

Card 1/1

89-4-5-3/26

AUTHORS: Kutateladze, S. S., Borishanskiy, V. M., Novikov, I. I.

TITLE: Heat Transfer to Liquid Metals ( Teploobmen v zhidkikh metallakh)

PERIODICAL: Atomnaya Energiya, 1958, Vol. 4, Nr 5, pp. 422 - 436 ( USSR)

ABSTRACT: From foreign and Soviet references a survey of data is given that have as yet been obtained on the heat exchange between solid surfaces and a flow of molten metal. Particularly the experimental data of the heat transfer to liquid metals are given if these metals flow in long or short tubes in plane slits. The availab'e data for the following cases are also given: The tubes or plates are longitudinally coated by liquified metal; cylinders are flowed around transversely; there is free convection; a condensation of the vapor of the liquid metal occurs. As heat carriers, mercury, an eutectic alloy of lead and bismuth, sodium and sodium-potassium are used. The influence od admixtures to these heat carriers on their heat

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Heat Transfer to Liquid Metals 89-4-5-3/26

transferring capacity is investigated. The respective formulae are derived for the heat transfer in various cases. There are 11 figures, 2 tables and 30 references, 14 of which are Soviet.

SUBMITTED: November 4, 1957

AVAILABLE: Library of Congress

1. Liquid metals—Heat transfer

Card 2/2

57-2-4-27/39

AUTHORS: Borishanskiy V. M., Kutateladze S. S.

TITLE: Heat Emission and Hydraulic Resistance in the Flow of Liquid Metals in Circular Tubes (Teplootdacha i gidravlicheskoye soprotivleniye pri techenii zhidkikh metallov v kruglykh trubakh)

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1958, Vol 28, Nr 4, pp 836-847 (USSR)

ABSTRACT: The authors performed an experimental investigation of the heat emission and of the hydraulic resistance in the flow of various liquid metals in tubes (bismuth, lead bismuth eutectic, sodium). The experiments were made in an iso-thermal ($\Delta t \to 0$) and a nonisothermal flow, where the heat currents changed up to 1300000 kcal/m$^2$ hour. The domain of the Pe coefficient covered by the experiments was 100 : 11000, that of the Pr coefficient 0.005 : 0.035, that of the diameters of the tubes from 5 to 35 mm and that of the relative lengths L/D from 5 to 90 at Re coefficients [illegible]0000. Formulae were obtained here with the aid of which the heat emission to the liquid metals turbulently flowing

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Heat Emission and Hydraulic Resistance in the Flow of Liquid Metals in Circular Tubes

S7 28 4 27/39

in circular tubes can be calculated: Nu = [illegible] + 0.002[illegible] Pe (when L/D > 30, Pe > 300, Re > 10000); Nu = [illegible] 7 $Pe^{1/3}$ (when 50 < Pe < 300, L/D > 30; Re > [illegible]04). It is shown that a modification of the viscosity can not exert any essential influence upon the drag. At the same time, however, the density of the investigated metals slightly depends on temperature. L. L. Shneyderman and N. I. [illegible] participated in the experiments. There are 9 figures, [illegible] table, and 9 references, 8 of which are Soviet.

SUBMITTED: November 23, [illegible]

Card 2/2

AUTHOR: Kutateladze, S. S. 57-28-4-28/39

TITLE: Heat-Emission During the Flow of Liquid Metals in a Tube and on a Plate (Teplootdacha pri techenii zhidkogo metalla v trube i na plastine)

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1958, Vol.28, Nr 4, pp.848-854 (USSR)

ABSTRACT: Some problems of the heat-exchange theory in media with $Pr \ll 1$ are treated here. The formula (1) for the relation of the turbulent heat-conductivity to the factor of the molecular heat conductivity in a flow in a circular tube shows that when $P_r \ll 1$ the molecular heat-conductivity is comparable with the turbulent one, even in the center of flow. On the other hand the tubulent heat-conductivity can in this case be disregarded in the domain of the viscous lower layer and the so-called intermediate layer. In a stabilized turbulent flow when $Pr \rightarrow 0$ the quantity Nu tends toward a certain constant value. This value, however, is higher than that in a laminar flow with a parabolic distribution of velocity. The high heat conductivity of the liquid

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57-28-4-28/39

Heat Emission During the Flow of Liquid Metals in a Tube and on a Plate

metals also leads to the fact that the heat-content of the volumes displaced due to turbulent pulsations is by way of mixture more rapidly dispersed, i.e. when $Pr \ll 1$ $\varepsilon < 1$ applies. ($\varepsilon$ denotes the factor of dissimilarity of the dispersion of motion- and heat-quantities in the case of a displacement of the "turbulent mole" (a reciprocal quantity to Prandtl's number )). In a general case the factor depends on the number Pr and on the nondimensional distance from the wall $\eta$. - It is shown that for molten metals as well in laminar as in turbulent flows $Nu \approx f(Pe, L/D)$ holds. The shape of this function depends on the hydrodynamic process (regime) in the flow. At present reliable experimental data exist according to which $\varepsilon$ amounts to about 0.5. - The specific heat and density are very slightly dependent on temperature. The factor of heat conductivity more markedly changes with temperature. When Pr = 0 the influence of the temperature-function of this factor upon the heat emission in liquid metals is highest. In the investigation of the flow round a plate in a longitudinal direction the author starts from equation (14) and shows that the tendency

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$Pr \rightarrow 0 \quad \frac{\delta}{\delta_W} \rightarrow 1.6\ Pr^{1/2}$ prevails.

$\delta$ denotes the thickness of the hydrodynamic boundary layer.
$\delta_W$ denotes the thickness of the boundary-heat-layer.

In the case of a free convection in liquid metals the essential influence of the molecular heat-conductivity extends into the turbulent domain of the flow. It has to be taken into account here that the velocity-field in the domain of the largest part of the boundary-heat-layer mainly depends on the forces of inertia. There are 3 figures, 1 table, and 5 references, 2 of which are Soviet.

SUBMITTED: August 30, 1956

KUTATELADZE, S S

Liquid-Metal Heat Transfer Media, by S.S. Kutateladze (and others) New York, Consultants Bureau, 1959.

149 p. diagrs., graphs, tables (supplement of the Soviet Journal of Atomic Energy, 1958, No. 2)

Translated from the original Russian: Zhidkometallicheskiye Teplonositeli, Moscow, 1958.

Bibliography: p. 147-149.

I Ku Ta Te LaDze, S.S.

21(4) PHASE I BOOK EXPLOITATION SOV/2583

International Conference on the Peaceful Uses of Atomic Engergy. 2nd, Geneva, 1958.

Doklady sovetskikh uchenykh; yadernyye reaktory i yadernaya energetika. (Reports of Soviet Scientists; Nuclear Reactors and Nuclear Power) Moscow, Atomizdat, 1959. 707 p. (Series: Its: Trudy, vol. 2) Errata slip inserted. 8,000 copies printed.

General Eds.: N.A. Dollezhal, Corresponding Member, USSR Academy of Sciences, A.K. Krasin, Doctor of Physical and Mathematical Sciences, A.I. Leypunskiy, Member, Ukrainian SSR Academy of Sciences, I.I. Novikov, Corresponding Member, USSR Academy of Sciences, and V.S. Fursov, Doctor of Physical and Mathematical Sciences; Ed.: A.P. Alyab'yev; Tech. Ed.: Ye. I. Mazel'.

PURPOSE: This book is intended for scientists and engineers engaged in reactor designing, as well as for professors and students of higher technical schools where reactor design is taught.

COVERAGE: This is the second volume of a six-volume collection on the peaceful use of atomic energy. The six volumes contain the reports presented by Soviet scientists at the Second International Conference on Peaceful Uses of Atomic Energy, held from September 1 to 13, 1958 in Geneva. Volume 2 consists of three parts. The first is devoted to atomic power plants under construction in the Soviet Union; the second to experimental and research reactors, the experiments carried out on them, and the work to improve them; and the third, which is predominantly theoretical, to problems of nuclear reactor physics and construction engineering. Yu. I. Koryakin is the science editor of this volume. See SOV/2081 for titles of all volumes of the set. References appear at the end of the articles.

KUTATELADZE, S.S.

Critical heat streams in the flow of a wetting fluid with a nucleus not heated up to the temperature of saturation. Nauch. dokl.vys.shkoly; energ. no.2:229-239 '59. (MIRA 13:1)
(Hydrodynamics)

SOV/89-7-3-9/29

21(9)

AUTHORS: Kutateladze, S. S., Ivashchenko, N. I., Zablotskaya, T. V.

TITLE: On the Influence of an Internal Heat Source on the Coefficient of Heat Transfer

PERIODICAL: Atomnaya energiya, 1959, Vol 7, Nr 3, pp 253-254 (USSR)

ABSTRACT: Internal heat sources exist in a flow of liquid, which carries radioactive impurities with it, or if an electric current passes through a liquid metal beam. The influence exercised by heat sources upon the thermal coefficient is theoretically investigated for the case in which the liquid carrying sources with it moves within a round tube. The tube is assumed to be sufficiently long in order that the places of disturbance at the entry of the liquid into the tube may be neglected. The formulas are written down practically without deduction, and the influence exercised by the density of the internal heat source upon a stabilizing heat transfer in the tube is shown graphically, in which case 1) an extreme turbulent flow ($\omega = 1$), 2) a laminar flow, and 3) a turbulent flow with the velocity distribution according to the 1/7-law is assumed. In general, the influence exercised by an internal source upon the heat transfer

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SOV/89-7-3-9/29

On the Influence of an Internal Heat Source on the Coefficient of Heat Transfer

coefficient is found to be not great and to be effective only at $\omega \neq 1$. There are 1 figure and 2 references, 1 of which is Soviet.

SUBMITTED: December 12, 1958

Card 2/2

GUKASOVA, Yekaterina Aleksandrovna; ZHUKOVSKIY, Mikhail Isaakovich; ZAVADOVSKIY, Anatoliy Mikhaylovich; ZYSINA-MOLOZHEN, Lariaa Mikhaylovna; SKNAR', Nikolay Akimovich; TYRYSHKIN, Vsevolod Georgiyevich; ZHUKOVSKIY, V.S., prof., doktor tekhn.nauk, red.; KUTATELADZE, S.S., prof., doktor tekhn.nauk, red.; ZHITNIKOVA, O.S., tekhn.red.

[Aerodynamic improvement of bladed apparatus of steam and gas turbines] Aerodinamicheskoe sovershenstvovanie lopatochnykh apparatov parovykh i gazovykh turbin. Pod red. V.S.Zhukovskogo i S.S.Kutateladze. Moskva, Gos.energ.izd-vo, 1960. 340 p. (MIRA 13:7)

(Steam turbines) (Gas turbines)

KUTATELADZE, S.S. (Leningrad)

Effect of the temperature factor on subsonic turbulent gas flow.
PMTF no.1:129-132 My-Je '60. (MIRA 14:8)

1. Institut teplofiziki Sibirskogo otdeleniya AN SSSR.
(Gas flow) (Turbulence)

KUTATELADZE, S.S.; LEONT'YEV, A.I.

Turbulent friction on a flat plate in supersonic gas flow.
PMTF no.4:43-48 N-D '60. (MIRA 14:7)
(Skin friction (Aerodynamics))
(Gas dynamics)

KUTATELADZE, S.S., prof., doktor tekhn.nauk; VINNIKOV, A.A., inzh.

Graph for calculating the heat conductivity of plates, cylinders, and spheres with linear variation in the temperature of the external medium. Izv. vys. ucheb. zav.; energ. 3 no.8:85-97 Ag '60. (MIRA 13:9)

1. TSentral'nyy nauchno-issledovatel'skiy kotloturbinyy institut im. I.I.Polzunova.
(Heat--Conduction)

S/089/60/009/006/003/011
B102/B212

11.9400 also 1498

AUTHORS: Kutateladze, S. S., Bobrovich, G. I.

TITLE: Application of the similarity method in generalizing experimental data obtained for the critical heat fluxes in a boiling liquid

PERIODICAL: Atomnaya energiya, v. 9, no. 6, 1960, 493-494

TEXT: Cooling of surfaces by liquids which form a boiling film or bubbles (which complicate the heat transfer considerably) on the surface has been investigated various times. The present "Letter to the Editor" contributes to this problem. There are two hypotheses which deal with the occurrence of a crisis during bubble-forming boiling. One of them has been formulated by G. N. Kruzhilin. According to this hypothesis, the first critical density of the heat flux is determined by the same criteria as the heat transfer during bubble boiling, i.e., the critical density of the heat flux is described by the function

$$q_{kp}\frac{r\gamma''}{\lambda T''(\gamma'-\gamma'')^{1/2}} = f\left[\frac{\nu}{a};\frac{c\gamma' T''\sqrt{\sigma(\gamma'-\gamma'')}}{(r\gamma'')^{2}};\frac{g\sigma}{\nu^{2}\gamma(\gamma-\gamma'')^{1/2}}\right]. \quad (1)$$

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Kruzhilin has suggested the following empirical formula for calculating $q_{crit}$

$$q_{кр} = 4700 \frac{T''^{0.33}\sigma^{0.25}(\gamma'-\gamma'')^{0.46}(r\gamma'')^{0.33}\lambda^{0.50}}{\gamma'^{0.31}c^{0.08}\mu^{0.14}} . \qquad (2)$$

The other hypothesis, which has been suggested by Kutateladze, assumes that the crisis at boiling is qualitatively a separate event. This event is related to the disturbance of the hydrodynamic stability of the two-phase boundary layer, which occurs when a critical rate of steam generation has been reached. This hypothesis makes it possible to obtain a number of formulas by employing the similarity theory. According to the hydrodynamic theory,

$$\frac{q_{кр}}{r\sqrt{g\gamma''\left(1+\frac{\gamma''}{\gamma'}\right)}\sqrt[4]{\sigma(\gamma'-\gamma'')}} = K = \mathrm{const}, \qquad (3)$$

describes the boiling of a non-viscous saturated liquid having a large volume. (2) and (3) satisfy the test results, although one has been obtained empirically and the other theoretically. (2) may be changed into

$$k = \frac{0.415\, T''^{0.32}}{\gamma'^{0.31}\gamma''^{0.14}r^{0.64}c^{0.08}\sigma^{0.04}\mu'^{0.14}(1+\gamma''/\gamma')^{0.50}} .$$

k has been calculated that way. The numerical results are compiled in a table.

KUTATELADZE, S.S., LEONTYEV, A. I.

"Approximate methods of Heat Transfer and Friction Calculation at Turbulent Motion of a Compressible gas."

Report submitted for the Conference on Heat and Mass Transfer, Minsk, BSSR, 1961.

KUTATELADZE, S.S.; ATENKOV, S., tekhn.red.

[Heat transfer in boiling; Conference on Heat and Mass Transfer, Minsk, January 23-27, 1961] Teploobmen pri kipenii; soveshchanie po teplo-i massoobmenu, g. Minsk, 23-27 ianvaria 1961 g. Minsk, 1961. 37 p. (MIRA 15:2)

(Heat—Transmission) (Ebullition)

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S/124/62/000/009/018/026
A001/A101

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21.5700

AUTHORS: Kutateladze, S. S., Burakov, B. A.

TITLE: Critical heat loads at free convection and forced motion of a boiling and underheated "Dowtherm" (dauterm)

PERIODICAL: Referativnyy zhurnal, Mekhanika, no. 9, 1962, 77 - 78, abstract 9B533 (In collection: "Vopr. teplootdachi i gidravliki dvukhfazn. sred", Moscow - Leningrad, Gosenergoizdat, 1961, 56 - 74)

TEXT: Large-scale experiments were conducted on vertical and horizontal steel tubes of d = 6 mm in diameter and l = 200 - 300 mm long at pressures of 10 and 1 atm, during boiling and underheating up to 120°C. An experimental graph, a table and the following equations are given:

$$q_{cr.o} = 0.2r\sqrt{g\gamma''}\sqrt[4]{\sigma(\gamma' - \gamma'')}$$

$$q_{cr.\vartheta} = q_{cr.o}\left[1 + 0.11\left(\frac{\gamma'}{\gamma''}\right)^{0.5}\frac{c\vartheta}{r}\right]$$

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S/124/62/000/009/018/026
A001/A101

Critical heat loads at free convection and...

The experiments were carried out at flow in a rectangular aperture of 20 x 120 mm, l = 2,000 mm on a plate 5 - 16 mm wide, 155 mm long and 1 mm thick, on a rod of d = 1 - 2 mm, and on a tube of 3 mm in outer diameter, t of the wall was not measured. Pressure was atmospheric, flow speed was 1.2 - 5 m/sec, underheating was 20 - 120°C. No effect of the shape and size of the heating surface on $q_{cr}$ was discovered.

P. I. Povarnin

[Abstracter's note: Complete translation]

Card 2/2

35047
S/693/61/000/000/005/007
D207/D302

26.5500

AUTHOR Kutateladze, S.S.

TITLE: Heat transfer in film condensation of vapor inside a horizontal tube

SOURCE Kutateladze, S.S. ed., Voprosy teplootdachi i gidravliki dvukhfaznykh sred; Sbornik statey, Moscow, Gosenergoizdat, 1961, 138-155

TEXT: There are three characteristics of condensation inside a horizontal tube 1) At moderate steam velocities a stream of condensate is formed at the bottom of the tube; 2) the principal motion of steam is perpendicular to the force of gravity acting on the condensate which runs down from the upper part of the tube; 3) in the upper part of the tube gravity tends to separate the condensate film from the wall against the forces of surface tension and of viscosity. The flow of condensate film becomes more and more axial as the velocity head of vapor increases until the effect of gravity can be neglected. The author presents results (for low and high

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D207/D302

Heat transfer in film ...

pressure vapors) which he obtained together with P.F. Kornilovich and E.P. Karpeyev. In all cases the author gives the mean (for the whole tube) coefficient of heat transfer which he found to increase roughly with the square root of heat load. A single tube horizontal evaporator was used. The experimental tube inside it was fed with a slightly superheated vapor. Absence of air was ensured by evaporation. Results are given for brass and oxidized iron tubes. Free flow of water in horizontal circular channels (half tubes) was also tested, for which the dimensionless depth of water in terms of the equivalent Reynolds number (for $R_e \leq 3000$) is given.

In the high pressure tests, stainless steel tubes of 10 and 17 mm diameter and 2000 and 4000 mm long were used. The following quantities were measured Amount of condensed primary steam; heat content of wet (5 to 7% dry) steam at the outlet of experimental tube; parameters of the primary and secondary steam; temperature at various points of the tube. The secondary condensate was returned to the boiling water in the evaporator tube. Before testing, steam at 90 atm was blown through the tube to expel air. Test pressures varied from 30 to 90 atm and the heat flux from

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Heat transfer in film ... D207/D302

$10^5$ to $10^6$ kcal/$m^2$ hr. Heat transfer round the tube was nearly uniform proving that the effect of gravity was small. A formula is derived for turbulent flow of the condensate. There are 7 figures, 6 tables and 6 references: 4 Soviet-bloc and 2 non-Soviet-bloc. The references to the English-language publications read as follows: R. Potter and S. Potel, Refrigerating Engineering, May 1956; W. Akkers, H. Deans and O. Crosser, Chemical Engineering Progress, 1958, no. 10.

Card 3/3

X

5777

S/114/61/000/001/004/009
E194/E355

11.9400

AUTHOR: Kutateladze, S.S., Doctor of Technical Sciences, Professor

TITLE: Influence of Rate of Circulation on the Heat-transfer Coefficient During Boiling in Tubes

PERIODICAL: Energomashinostroyeniye, 1961, No. 1, pp. 12 - 15

TEXT: This article integrates the results of other authors and proposes a simple interpolation formula to allow for the combined influence on the intensity of heat transfer of forced convection and the process of steam generation. In steam boilers, atomic reactors and other steam-raising equipment the process of boiling in tubes takes place under conditions of a certain speed of circulation of the liquid. It has been known for a long time that under certain conditions the rate of circulation and the process of steam generation have a mutual influence on the heat-transfer coefficient. However, many workers have shown that with a high rate of heat flux the speed of circulation has practically no influence on

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S/114/61/000/001/004/009
E194/E335

Influence of Rate of Circulation on the Heat Transfer Coefficient During Boiling in Tubes

the intensity of heat transfer during boiling. Under conditions of natural circulation there is an optimum condition of operation of an evaporator for which practically the whole of the heating surface is generating steam and the heat transfer relationships are close to those of developed boiling in a large volume. Many authors have found that speed of flow either has no influence or was automatically allowed for by coefficients of proportionality. Formulae given by a number of authors are quoted to bear out this statement.
Thus, there is a region of rate of heat flow in which the heat-transfer coefficient during boiling is practically independent of the rate of flow of liquid at any rate when it does not depend on the steam content of the flow. This region is termed the region of developed boiling. In this case heat transfer during boiling in tubes is [illegible] ned by a system of criteria, as per Eq (8)

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E194/E355

Influence of Rate of Circulation on the Heat-transfer Coefficient During Boiling in Tubes

As the process of boiling develops, its influence on the boundary layer becomes more and more important. Finally, the movement of liquid in the layer adjacent to the walls due to the formation, growth and breakaway of steam bubbles, becomes much more important than the effect of the mean flow of the steam-liquid mixture as a whole.
It has been proposed, to a first approximation, to assess the influence of forced circulation and the process of steam formation by the ratio of the heat-transfer coefficient corresponding to convective heat exchange without boiling ($\alpha_o$) to that for convective heat exchange with developed boiling ($\alpha_{oo}$). A simple interpolation formula that satisfies the necessary conditions is of the form:

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Influence of Rate of Circulation on the Heat-transfer Coefficienr During Boiling in Tubes

$$\frac{\alpha}{\alpha_o} = \sqrt[n]{1 + \left(\frac{\alpha_{oo}}{\alpha_o}\right)^n} \qquad (12)$$

Experimental results are quoted for particular conditions of flow in pipes combined with heat transfer which if expressions (7) and (12) are valid, should lie on straight lines in the system of coordinates given by expression (14)
The results are plotted in Fig. 3 and it will be seen that the linearity is satisfactory for practical puposes when n in Eq. (12) is 2.
Further results are then quoted and it is concluded that the combined influence of rate of circulation and the process of boiling on the heat-transfer coefficient may be represented by

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S/114/61/000/001/004/009
E194/E355

Influence of Rate of Circulation on the Heat-transfer Coefficient During Boiling in Tubes

the interpolation formula (12). The existing limited experimental data on the boiling of water in tubes indicates that the value of n in this formula equals 2, which is convenient for practical calculations. The heat-transfer coefficient during developed boiling in tubes is described by expression (7), which is of the same type as those applicable to boiling in a large volume. There is need for further careful experimental study of how the combined influence of organised flow of liquid in the process of steam formation affects the heat transfer. Acknowledgments are made to T.G. Filippova and Ya.A. Mitsel' for assistance in calculations. There are 6 figures and 15 references: 14 Soviet and 1 non-Soviet.

Card 5/5

23748

S/170/61/004/006/002/015
B129/B212

10 4100 2115 2807 2607
11.9000

AUTHORS: Kutateladze, S. S., Leont'yev, A. I.

TITLE: Resistance and heat transfer in a turbulent boundary layer of a compressed gas and the calculation of friction and heat transfer

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, v. 4, no. 6, 1961, 33-41

TEXT: A method based on the laws of friction and heat transfer is brought to calculate the friction and the heat transfer in a turbulent boundary layer of a compressed gas. The theoretical law is found for the resistance and the heat transfer for the turbulent boundary layer of such a gas and the relative effects of heat transfer and compressibility on friction and heat transfer are calculated. This makes it possible to simplify methods of solving integral relations of the boundary layer of the compressed gas for the forming of streamlines with longitudinal velocity gradient and temperature gradient in regions, which are at a certain distance from the separation point. In a detailed investigation the formula

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23748

S/170/61/004/006/002/015
B129/B212

Resistance and heat transfer ...

$$\left(\frac{c_f}{c_{f_0}}\right)_{Re^{**}} = \frac{r}{(\psi^* - 1)(1 - 11{,}6\sqrt{c_{f_0}/2})} \times$$
$$\times\left[\arcsin\frac{2(\psi^* - 1) + r\varepsilon\Delta\psi}{\sqrt{4r(\psi^* - 1)(\psi^* + \Delta\psi) + (r\varepsilon\Delta\psi)^2}} - \right.$$
$$\left. - \arcsin\frac{2(\psi^* - 1)\,11{,}6\sqrt{c_{f_0}/2} + r\varepsilon\Delta\psi}{\sqrt{4r(\psi^* - 1)(\psi^* + \Delta\psi) + (r\varepsilon\Delta\psi)^2}}\right]^2. \quad (20)$$

is derived for the friction of a turbulent boundary layer of a compressed gas. Fig. 3 brings a comparison of the data obtained with (20) and experimental results, which are taken from an earlier paper of the authors (PMTF, no. 4, 1960). The data agree well for $M = 10$ and $T_{equ} = 0.16$. It is shown that even in the first approximation the theoretical formula is satisfactory for calculating the effect of the Reynolds number on the relative change of the friction coefficient with the temperature factor. All

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experimental data agree with the theoretical calculation within the limits of measuring accuracy. Using the law of conservation for the turbulence constant it can be extended to the transition from the laminar boundary layer to the developed turbulent one. Here, it should be born in mind that in general a great accuracy of the calculation formulas will not be required in the transition zone, so far as its characteristics are not stable by their nature. There are 4 figures and 14 references: 7 Soviet-bloc and 7 non-Soviet-bloc. The most important references to English-language publications read as follows: Eckert E., Trans. ASME 78, 1273, 1956; Van Driest, F. Aeron. Sci., 19, 55, 1952.

ASSOCIATION: Institut teplofiziki Sibirskogo otdeleniya AN SSSR, Moskva (Institute of Heat Physics of the Siberian Department of AS USSR, Moscow)

PRESENTED: March 18, 1961

KUTATELADZE, S.S., doktor tekhn.nauk, prof.; KONSETOV, V.V., inzh.

Heat exchange during the condensation of steam in vertical pipes. Izv. vys. ucheb. zav.; energ. 4 no.11:63-69 N '61. (MIRA 14:12)

1. TSentral'nyy nauchno-issledovatel'skiy kotloturbinnyy institut imeni I.I.Polzunova.
(Heat--Transmission) (Steam) (Steampipes)

S/862/62/002/000/002/029
A059/A126

AUTHOR: Kutateladze, S.S.

TITLE: Heat exchange in boiling

SOURCE: Teplo- i massoperenos. t. 2: Teplo- i massoperenos pri fazovykh i khimicheskikh prevrashcheniyakh. Ed. by A.V. Lykov and B.M. Smol'skiy. Minsk, Izd-vo AN BSSR, 1962. 44 - 59

TEXT: This is a survey on boiling-heat transfer dealing with some special problems of fundamental importance in nucleate boiling and the generalization of the results of experimental work. With reference to the author's own papers and those of other scientific workers, Eastern and Western, various problems are discussed, such as the origin of vapor bubbles, rate of growth of the water vapor bubble, the first critical density of the thermal flow in tubes and channels, the critical density of flow on free convection in a great liquid volume, the influence of forced convection on heat exchange for nucleate boiling in tubes, and the heat exchange in developed nucleate boiling. There are 6 figures.

ASSOCIATION: Institut teplofiziki SO AN SSSR (Institute of Thermophysics of the Siberian Department of the AS USSR)

Card 1/1

S/

AM4007934

BOOK EXPLOITATION

Kutateladze, Samson Semenovich; Leont'yev Aleksandr Ivanovich

The turbulent boundary layer of compressible gas (Turbulentny*y pogranichny*y sloy szhimayemogo gaza) Novosibirsk, Izd-vo Sib. otd. AN SSSR, 1962. 179 p. illus., biblio. Errata slip inserted. 1500 copies printed. Sponsoring agency: Akademiya nauk SSSR. Sibirskoye otdeleniye.

TOPIC TAGS: turbulent boundary layer, compressible gas flow, boundary layer theory

PURPOSE AND COVERAGE: This book is intended for scientific workers, aerodynamic engineers, thermophysicists, and students of advanced courses in these specialties. It may also be used as a handbook for practical calculations in design bureaus. The book presents a turbulent-boundary-layer theory of a compressible gas. The theory is based on the investigation of relative variations of coefficients of friction and heat transfer with increase in Mach number, the heat transfer factor, and the wall permeability factor. The existence of the limiting law corresponding to rather high Re numbers and nearly total self-modeling of relative varia-

Card 1/3 2

AM4007934

tions of friction and heat transfer coefficients is demonstrated. Simple engineering methods are proposed for the solution of heat-transfer problems in turbulent flow over solid bodies. Theoretical and experimental data are compared. The Prandtl-Karman and Taylor semiempirical theory of near-wall turbulence was used to explain the existence of the logarithmic velocity profile in isothermal fluid flow at weak pressure gradients over impermeable surfaces.

TABLE OF CONTENTS [Abridged]:



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VITAMIN, Lyudmila Aleksandrovna; KATSNEL'SON, Boris Davidovich; PALEYEV, Il'ya Isaakovich; KUTATELADZE, S.S., red.; SOBOLEVA, Ye.M., tekhn.red.

[Atomization of liquids by spray nozzles] Raspylivanie zhidkosti forsunkami. Pod red. S.S.Kutateladze. Moskva, Gosenergoizdat, 1962. 263 p. (MIRA 15:7)
(Atomization) (Combustion)

LYKOV, A.V., akademik, red.; SMOL'SKIY, B.M., prof., red.; KUTATELADZE, S.S., prof., red.; PALEYEV, I.I., prof., red.; EL'PERIN, I.T., kand. tekhn. nauk, red.; TIMOFEYEV, L., red. izd-va; VOLOKHANOVICH, I., tekhn. red.

[Heat and mass transfer]Teplo- i massoperenos; doklady. Pod obshchei red. A.V.Lykova i B.M.Smol'skogo. Minsk, Izd-vo Akad. nauk BSSR. Vol.2.[Heat and mass transfer during phase transitions and chemical transformations]Teplo- i massoperenos pri fazovykh i khimicheskikh prevrashcheniiakh. 1962. 377 p. (MIRA 16:3)

1. Vsesoyuznoye soveshchaniye po teplo- i massoobmenu. 1st. Minsk, 1961. 2. Akademiya nauk Belorusskoy SSR (for Lykov).
(Heat--Transmission) (Mass transfer)
(Phase rule and equilibrium)

ALYAMOVSKIY, Mikhail Ivanovich; PROMYSLOV, Aleksandr Aleksandrovich; VASIL'YEV, V.K., doktor tekhn. nauk, prof., retsenzent; AGAFONOV, V.A., kand. tekhn. nauk, retsenzent; KUTATELADZE, S.S., nauchnyy red.; VLASOVA, Z.V., red.; KRYAKOVA, D.M., tekhn. red.

[Marine condenser plants]Sudovye kondensatsionnye ustanovki. Leningrad, Sudpromgiz, 1962. 401 p. (MIRA 15:9)
(Condensers (Steam)) (Marine engineering)

KUTATELADZE, Samson Semenovich. Prinimali uchastiye: LEONT'YEV, A.I.; BORISHANSKIY, V.M.; ZYSINA, L.M., doktor tekhn. nauk, retsenzent; GORDOV, A.N., kand. fiz.-mat. nauk, red.; ONISHCHENKO, R.N., red. izd-va; MITARCHUK, G.A., red. izd-va; SHCHETININA, L.V., tekhn. red.

[Fundamentals of the heat transfer theory] Osnovy teorii teploobmena. Izd.2., dop. i perer. Moskva, Mashgiz, 1962. 455 p. (MIRA 15:7)

(Heat—Transmission)

S/207/62/000/001/005/018
B104/B108

21.5900
10.1300

AUTHORS: Kutateladze, S. S., Leont'yev, A. I. (Novosibirsk, Moscow)

TITLE: Turbulent boundary layer of a gas on a permeable wall

PERIODICAL: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 1, 1962, 51 - 60

TEXT: The authors show that limiting laws not dependent on the empirical turbulence constants exist for the relative effect of various factors in a turbulent boundary layer on the coefficient of friction. With the theory of limiting laws of a turbulent boundary layer a method is presented of calculating heat transfer and friction on a porous plate and on the surface of the front part of a body in the turbulent boundary layer. The law

$$\left(\frac{c_f}{c_{f_0}}\right)_{R_x} = (1-0.25b)^2(1+0.25b)^{-0.4} \qquad (14)$$

is obtained where $c_f$ denotes the local coefficient of friction, $c_{fo}$ the

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B104/B108

Turbulent boundary layer of a gas...

local coefficient of friction for isothermal stationary flow, b a factor characterizing permeability. This law agrees well with the experimental results of several authors (D. S. Hacker, Jet Propulsion, 1956, v. 26, no. 9; H. S. Mickley and R. S. Davis, Momentum Transfer for Flow over a Flat Plate with Blowing, NACA TN 4017, November 1957; C. C. Pappas, A. F. Okuno, of the Aero Space Sci., 1960, v. 27, no. 5, pp. 321 - 323). Experimental data of H. S. Mickley (see above) and J. A. Friedman (J. Am. Roc. Soc., 1949, no. 79, pp. 147 - 154) on the influence of gas blowing on the convective heat transfer are compared to the limiting law of heat transfer

$$\Psi_T = \left(1 - \frac{b_T}{b_{T_*}}\right)^2; \quad b_{T_*} = b_* = 4.0 \qquad (16)$$

in Fig. 5. $b_T$ is the parameter of thermal permeability, $b_*$ the critical permeability corresponding to separation of the boundary layer from the wall. A similar formula for the effect of gas blowing on the coefficient of friction also agrees well with experimental data. V. P. Motulevich
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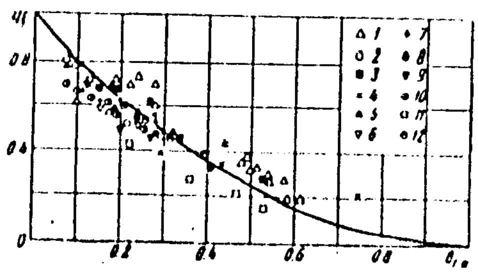
Turbulent boundary layer of a gas... S/207/62/000/001/008/018
B104/B108

(IFZh, 1960, v. 3, no. 8) and L. Ye. Kalikhman (ZhTF, 1955, v. 25, no. 11) are mentioned. There are 8 figures and 18 references: 10 Soviet and 8 non-Soviet.

SUBMITTED: July 26, 1961

Fig. 5. Effect of gas blowing on convective heat transfer. Legend: The values 1.2, 0.5, 0.25, 0.6, 2.15, 1.55, 0.7, 1.5, 1.35, 0.35, 0.65 for $R_D \cdot 10^{-5}$ correspond to the points 2 - 12.



Card 3/3

42045

S/207/62/000/004/004/006
I054/I242

AUTHORS: Bobrovich, G.I., Gogonin, I.I., Kutateladze, S.S., and Moskvicheva, V.N. (Novosibirsk)

TITLE: Critical heat flux in the boiling of binary mixtures

PERIODICAL: Zhurnal prikladoy mekhaniki i tekhnicheskoy fiziki, no.4, 1962, 108-111

TEXT: The work of W.R. Wijk et al (Ref. 2: Chem. Eng. Sci. 1956, vol.5) is discussed. A detailed description of the experimental apparatus and methods of measuring the critical heat flux in boiling binary mixtures is given. The critical heat flux for a mixture of water and butyl-alcohol reached its maximim at a concentration of 15-20% alcohol, and the absolute value of the flux is of the same order of magnitude as for pure water. The minimum is reached at a concentration of 2-3% alcohol. A mixture of water and ethyl alcohol gave similar results. An increase of pressure reduces the effect of the alcohol concentration on boiling. The results are plotted

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S/207/62/000/004/004/006
I054/I252

Critical heat flux in the...

as heat-flux versus temperature diagrams, with pressure as a parameter. There are 4 figures.

SUBMITTED: February 16, 1962

Card 2/2

31876
S/170/62/005/001/004/013
B104/B102

10.1300

AUTHORS: Kutateladze, S. S., Leont'yev, A. I.

TITLE: Calculation of a turbulent boundary layer at strong positive pressure gradients

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, v. 5, no. 1, 1962, 33-41

TEXT: A turbulent boundary layer is calculated on the basis of limiting laws of friction and heat exchange in the diffusion zone of a gas flow. The theory of these laws, developed in previous papers by the authors (PMTF, no. 4, 1960; IFZh, no. 6, 1961), makes it possible to analyze the effect of the pressure gradient on the turbulent boundary layer. The critical parameters at the point of separation of the turbulent boundary layer are determined, and the effect of heat exchange and compressibility of the gas on these parameters is assessed. It is shown that the heat exchange is only slightly dependent on the pressure gradient in the range of variation of Re**. Based on integral expressions for momentum and energy, heat exchange and friction are calculated with the help of the limiting laws mentioned. Mention is made of L. G. Loytsyanskiy

Card 1/2

(Mekhanika zhidkosti i gaza, - Mechanics of liquids and gases, - Fizmatgiz, M., 1959), L. Ye. Kalikhman (Turbulentnyy prograničhnyy sloy na krivolineynoy poverkhnosti, obtekayemoy gazom,-Turbulent boundary layer at a curved surface along which a gas flows - Oborongiz, M., 1956), L. M. Zysina-Molozhen (ZhTF, XXII, no. 11, 1952), G. M. Bam-Zelikovich (Izv. AN SSSR, OTN, no. 12, 1954), and P. N. Romanenko, A. I. Leont'yev, A. N. Oblivin (Sb. dokladov mezhvuzovskoy konferentsii po teorii teploobmena, 1961). There are 4 figures and 19 references: 11 Soviet and 8 non-Soviet. The three references to English-language publications read as follows: Clauser F. J. Aeron. Sc., 21, no. 2, 1957; Stratford J. Fluid Mech., 5, no. 1, 1-16, 1959; Townsend A. A. J. Fluid Mech., 8, no. 1, 143-155, 1960.

ASSOCIATION: Institut teplofiziki Sibirskogo otdeleniya AN SSSR, g. Moskva (Institute of Heat Physics of the Siberian Department AS USSR, Moscow)

SUBMITTED: August 7, 1961

Card 2/2

STREL'TSOV, V.V.; SHCHUKIN, V.K.; REBROV, A.K.; FUKS, G.I.; KUTATELADZE, S.S.; LYKOV, A.V.; PREDVODITELEV, A.S.; KONAKOV, P.K.; DUSHCHENKO, V.P.; MAKSIMOV, G.A.; KRASNIKOV, V.V.

Readers' response to I.T. El'perin's article "Terminology of heat and mass transfer" in IFZh No.1, 1961. Inzh.-fiz. zhur. 5 no.7:113-133 Jl '62. (MIRA 15:7)

1. Khimiko-tekhnologicheskiy institut, g. Ivanovo (for Strel'tsov). 2. Aviatsionnyy institut, Kazan' (for Shchukin, Rebrov). 3. Politekhnicheskiy institut, Tomsk (for Fuks). 4. Institut teplofiziki Sibirskogo otdeleniya AN SSSR, Novosibirsk (for Kutateladze). 5. Energeticheskiy institut AN BSSR, Minsk (for Lykov). 6. Gosudarstvennyy universitet imeni Lomonosova, Moskva (for Predvoditelev). 7. Institut inzhenerov zheleznodorozhnogo transporta, Moskva (for Konakov). 8. Institut legkoy promyshlennosti, Kiyev (for Dushchenko). 9. Vsesoyuznyy zaochnyy institut pishchevoy promyshlennosti, Moskva (for Maksimov). 10. Tekhnologicheskiy institut pishchevoy promyshlennosti, Moskva (for Krasnikov).
(Heat—Transmission) (Mass transfer)

NOVIKOV, I.I.; KUTATELADZE, S.S., prof.; LEONT'YEV, A.I.; MUSLIN, Ye.

Science of fire and cold. Nauka i zhizn' 29 no.1:58-59 Ja '62. (MIRA 15:3)

1. Direktor Instituta teplofiziki Sibirskogo otdeleniya AN SSSR; chlen-korrespondent AN SSSR (for Novikov). 2. Zaveduyushchiy laboratoriyey termogazodinamiki Instituta teplofiziki Sibirskogo otdeleniya AN SSSR (for Leont'yev).

(Thermodynamics)

BORISHANSKIY, V.M., red.; KUTATELADZE, S.S., red.; LEL'CHUK, V.L., red.; NOVIKOV, I.I., red.; ROMANOVA, L.A., red.; MAZEL', Ye.I., tekhn. red.

[Liquid metals] Zhidkie metally; sbornik statei. Moskva, Gosatomizdat, 1963. 326 p. (MIRA 16:12)

(Liquid metals—Thermal properties)

AGAFONOV, Vladimir Andreyevich [deceased]; YERMILOV, Valentin Georgiyevich; PANKOV, Yevgeniy Vasil'yevich; VASIL'YEV, V.K., doktor tekhn. nauk, prof., retsenzent; KUTATELADZE, S.S., doktor tekhn. nauk, prof., retsenzent; SHEDYUKOV, S.A., nauchn. red.; SHIRKOV, Yu.I., red.; CHISTYAKOVA, R.K., tekhn. red.

[Marine condenser plants] Sudovye kondensatsionnye ustanovki. Leningrad, Sudpromgiz, 1963. 482 p. (MIRA 16:12)

(Marine engineering) (Condensers (Steam))

L 17453-63 EPR/EPA(b)/EPF(c)/EWT(1)/EPF(n)-2/BDS/ES(v) AEDC/AFFTC/AFMDC/
ASD/IJP(C)/SSD Ps-4/Pd-4/Pr-4/Pu-4/Pe-4 WW
ACCESSION NR: AP3006128 S/0207/63/000/004/0088/0093

85

AUTHOR: Kutateladze, S. S. (Novosibirsk); Leont'yev, A. I. (Novosibirsk); Rubtsov, N. A. (Novosibirsk)

TITLE: Evaluation of the role of radiation in calculating the heat transfer in a turbulent boundary layer

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 4, 1963, 88-93

TOPIC TAGS: heat transfer, radiation, convection, boundary layer, turbulent boundary layer, radiative heat transfer, heat radiation, radiating gas

ABSTRACT: Heat transfer by radiation and convection in a turbulent boundary layer has been analyzed. Thermal radiation from a high-temperature gas affects the temperature field in the boundary layer and consequently the conditions of heat transfer by conduction and convection. With allowance for these factors, the analysis was based on relationships previously derived by the authors for heat transfer and friction in a turbulent boundary layer. A combined Stanton number (S) was used as a criterion for the overall convective-radiative heat

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L 17451-63
ACCESSION NR: AP3006128

0

transfer. The resulting equation was applied to calculate heat transfer from a high-temperature radiating gas to a flat plate. The results shown in Fig. 1 of the Enclosure demonstrate that the optical density (k) has a substantial effect on heat transfer, particularly at high $N/S_0$ ratios ($N/S_0$ characterizes the fraction of radiation in undisturbed flow; $S_0$ is the Stanton number for a nonradiating gas at constant physical parameters inside the boundary layer). The comparatively simple formula derived can be used for the approximate solution of radiative-convective heat-transfer problems. Orig. art. has: 2 figures and 18 formulas.

ASSOCIATION: none

SUBMITTED: 12Mar63 DATE ACQ: 11Sep63 ENCL: 01

SUB CODE: AS, PR NO REF SOV: 003 OTHER: 002

Card 2/1

APPROVED FOR RELEASE: 03/13/2001 CIA-RDP86-00513R000927910014-8"

KUTATELADZE, S.S.; LEONT'YEV, A.I.

Thermal screen in a turbulent boundary layer of gas. Teplofiz. vys. temp. 1 no.2:281-290 S-O '63. (MIRA 17:5)

1. Institut teplofiziki Sibirskogo otdeleniya AN SSSR.

S/0294/63/001/003/0458/0460

ACCESSION NR: AP4017726

AUTHORS: Kutateladze, S. S.; Leont'yev, A. I.

TITLE: Effect of gas dissociation on friction and heat exchange in a turbulent boundary layer

SOURCE: Teplofizika vy*sokikh temperatur, v. 1, no. 3, 1963, 458-460

TOPIC TAGS: boundary layer, turbulent boundary layer, laminar boundary layer, gas friction, gas dissociation, heat exchange, hypersonic flow, limit law theory

ABSTRACT: Gas dissociation in a turbulent layer, which unlike that in a laminar layer has not been thoroughly investigated, is considered for hypersonic velocities ($M > 10$) and the law of friction and heat exchange is derived on the basis of the limit laws established by the authors elsewhere (Turbulentny*y pogranichny*y sloy szhimayemogo

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ACCESSION NR: AP4017726

gaza, Sib. otd. AN SSSR, 1962). The final friction equation is, allowing for compressibility and heat exchange,

$$\left(\frac{c_f}{c_{f0}}\right)_{Re^{**}} = \frac{1}{\psi^*-1}\left[\arcsin\frac{2(\psi^*-1)+\Delta\psi}{\sqrt{4(\psi^*-1)(\psi^*+\Delta\psi)+(\Delta\psi)^2}} - \arcsin\frac{\Delta\psi}{\sqrt{4(\psi^*-1)(\psi^*+\Delta\psi)+(\Delta\psi)^2}}\right]^2\left(\frac{2}{\sqrt{\bar{a}}+1}\right)^2,$$

where $c_f$ -- friction coefficient under the conditions in question, $c_{f0}$ -- friction coefficient for flow of an incompressible liquid around a flat plate, Re** -- critical Reynolds number, $\psi^*$ -- kinetic factor, $\Delta\psi = \psi - \psi^*$ -- heat exchange factor, $\alpha$ -- degree of dissociation. Comparison of a simplified version of this formula (for Reynolds numbers from $10^5$ to $10^7$) with computer results given by W. Dorrance (ARS Journal, v. 31, no. 1, 1961) showed both qualita-

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ACCESSION NR: AP4017726

tive and quantitative agreement. The maximum relative influence of the gas dissociation on friction in the turbulent boundary layer does not exceed 25%. Orig. art. has: 1 figure and 10 formulas.

ASSOCIATION: Institut teplofiziki Sibirskogo otdeleniya AN SSSR (Institute of Thermophysics, Siberian Department AN SSSR)

SUBMITTED: 29May63 DATE ACQ: 23Mar64 ENCL: 00

SUB CODE: PH, AI NO REF SOV: 002 OTHER: 004

Card 3/3

KUTATELADZE, S.S.; LEONTYEV, A.I. (Novosibirsk)

"Limiting friction and heat transfer laws in turbulent boundary layer".

report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow, 29 Jan - 5 Feb 64.

L 51475-65 EWP(m)/EPF(c)/EPF(n)-2/EPR/EWT(1)/FCS(k)/EWG(m)/EWA(1) Pd-1/Pr-4/
Ps-4/Pu-4/Pi-4 WW

AM5012942 BOOK EXPLOITATION S/ 71
59
B+1

Kutateladze, S. S., ed.

Heat and mass transfer and friction in a turbulent boundary layer (Teplomassoobmen i treniye v turbulentnom pogranichnom sloye) Novosibirsk, Redizdat Sit. otd. AN SSSR, 1964. 206 p. illus., biblio. Errata slip inserted. 1000 copies printed. (At head of title: Akadmeiya nauk SSSR. Sibirskoye otdeleniye. Institut teplofiziki) Editor: L. I. Shpakovskaya; Technical editor: Ye. G. Shmakova; Proofreader: L. I. Korshunova

TOPIC TAGS: boundary layer flow, detached flow, friction, heat transfer, incompressible fluid, mass transfer, nonisothermal flow, radiation effect, turbulent boundary layer

PURPOSE AND COVERAGE: This book is a continuation of the monograph by S. S. Kutateladze and A. I. Leont'yev, published in 1962, in which certain properties of the limiting laws of friction and heat transfer in the turbulent boundary layer on a solid were formulated and specific applications of these laws were analyzed. The basic portion of the book was written by Kutateladze and A. I. Leont'yev.

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16

N. A. Rubtsov was mainly responsible for the development of problems of the interaction of the turbulent boundary layer with radiation. The theory of the flow structure beyond the region of detachment was developed by M. A. Gol'dshtik. Others who helped prepare the book were N. N. Kirillova, B. P. Mironov, V. A. Mukhin, N. V. Mukhina, A. K. Rebrov, V. K. Fedorov, M. V. Davydova, S. A. Druzhinin, E. P. Volchkov, Ye. M. Khabakhpasheva, I. G. Malenkov, V. N. Moskvicheva, and L. S. Shtokolov. Professor D. B. Spolding helped in the analysis of certain interesting questions.

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L 51475-65
AM5012942



SUB CODE: ME SUBMITTED: 30ct64 NR REF SOV: 049

OTHER: 070 DATE ACQ:

Card 3/3

ACCESSION NR: AP4034280 S/0207/64/000/002/0146/0149

AUTHORS: Bobrovich, G. I. (Novosibirsk); Kutateladze, S. S. (Novosibirsk)

TITLE: Effect of concentration of alcohol water mixture on the critical heat flow density

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 2, 1964, 146-149

TOPIC TAGS: alcohol water mixture, critical heat flux, ethyl alcohol, boiling heat transfer, one component liquid, unstable foam

ABSTRACT: The existing formulas of Kutateladze and Borishanskiy for the critical heat flux are applicable only to single component liquids. The dependence of the heat flux on the concentration of a mixture of liquids is complicated by a tendency for the formation of unstable foam upon the surface on which boiling takes place. The authors investigated experimentally the dependence of critical heat flux on the concentration of ethyl alcohol in water at a pressure of 1 atm abs. The surfaces used were a wire 0.5 mm in diameter and a plate of large size and about 6 mm thick, standing on its narrow edge. The results are given in Fig. 1 on the Enclosure. Here curve 1 represents the case of the wire, curve 2 the case of the plate, and curve 3 shows the difference between the experimental

ACCESSION NR: AP4034280

results on the plate and the corresponding values calculated from the Kutateladze and Borishanskiy formulas. The authors thank Yu. L. Sorokin and A. I. Leont'yev for their critique of this work. Orig. art. has: 2 figures, 3 graphs, and 6 equations.

ASSOCIATION: none

SUBMITTED: 03Dec63 DATE ACQ: 15May64 ENCL: 01

SUB CODE: TD,ME NO REF SOV: 008 OTHER: 013

ACCESSION NR: AP4034280

ENCLOSURE: 01

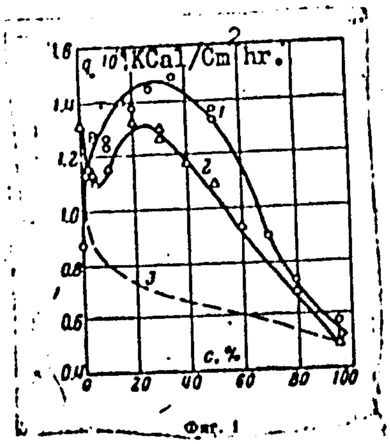


Fig. 1.

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S/0170/64/000/004/0025/0027

ACCESSION NR: AP4038659

AUTHOR: Kutateladze, S. S.; Yas'ko, O. I.

TITLE: Generalization of the characteristics of electric arc heaters

SOURCE: Inzhenerno-fizicheskiy zhurnal, no. 4, 1964, 25-27

TOPIC TAGS: Electric arc heater, arc heater, electric arc, turbulent gas flow, gas vortex

ABSTRACT: Low-temperature heaters with turbulent gas stabilization air and nitrogen were used as an example to show the possibility of generalizing the volt-ampere characteristics of electric arc heaters. In this treatment of the problem, the independent parameters are the geometry of the anode and cathode, the geometry of the gas vortex, the intensity of the current passing through the electric arc, the gas flow rate, and the kind of gas. A criterial equation is derived which correlates the volt-ampere characteristics of such heaters. It was found that despite appreciable changes in the parameters, all the data can be represented by a single curve in generalized coordinates. This shows that even the description of such complex phenomenon as an electric arc can in certain

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ACCESSION NR: AP4038659

cases be carried out with a small number of criteria. Orig. art. has: 2 figures and 4 formulas.

ASSOCIATION: Institut teplo-i massoobmena, AN BSSR, Minsk (Institute of Heat and Mass Transfer, AN BSSR)

SUBMITTED: 26Jul63 DATE ACQ: 19May64 ENCL: 00

SUB CODE: EE NO REF SOV: 006 OTHER: 003

Card 2/2

BOBROVICH, G.I. (Novosibirsk); GOGONIN, I.I. (Novosibirsk); [illegible],
S.S. (Novosibirsk)

Effect of the size of the heating surface on the critical
heat flux during boiling of a large volume of liquid.
PMTF no.4:137-138 Jl-Ag '64. (MIRA 17:10)

L 43720-65 EWT(1)/EWP(e)/EWP(m)/EWT(m)/EPR/EWP(t)/EWP(k)/EWP(z)/FCS(k)/EWP(b)/ EWA(1) Pd-1/Pf-4/Pi-4 JD/WW

ACCESSION NR: AP5008493 S/0207/64/000/006/0057/0062 45 B

AUTHOR: Kutateladze, S. S. (Novosibirsk); Leont'yev, A. I. (Novosibirsk)

TITLE: A nonuniform turbulent boundary layer of gas on a permeable plate 18

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 6, 1964, 57-62

TOPIC TAGS: boundary layer, turbulent boundary layer, turbulent flow, friction, heat exchange, permeable plate, Reynolds number, gas injection

ABSTRACT: The article cursorily deals with the results of the application of the theory of the relative laws of friction and heat exchange to the flow of a binary, turbulent boundary layer on a permeable plate in the region of finite values of Reynolds number R. This study was undertaken because the problem of calculating the boundary layer on a surface of separation, or on an absorbing mass, which can be reduced to the problem of flow around a semipermeable surface, cannot be solved in sufficiently complete form by the semi-empirical theories of the turbulent boundary. Though the solution developed in this article for the region of finite values of Reynolds** number is somewhat more complicated, it is logically less faulty. The experimental points for the injection of the most diverse gases for

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L 43720-65
ACCESSION NR: AP5008493

values of $\mu_1$ from 2 to 121, [$\mu_1$ is unidentified in the text] are closely grouped along the curve plotted from the calculated values. Orig. art. has: 5 figures and 22 formulas.

ASSOCIATION: none

SUBMITTED: 17Feb64 ENCL: 00 SUB CODE: ME

NO REF SOV: 004 OTHER: 008

ml
Card 2/2

L 52160-65 EWP(m)/EWT(1)/FCS(k)/EWA(d)/EWA(1) Pd-1

ACCESSION NR: AP5013370 UR/0207/65/000/002/0050/0053

AUTHORS: Volchkov, E. P. (Novosibirsk); Kutateladze, S. S. (Novosibirsk); Leont'yev, A. I. (Novosibirsk) 26 B

TITLE: Interaction between a submerged turbulent jet and a solid wall

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 2, 1965, 50-53

TOPIC TAGS: Nusselt number, turbulent flow, turbulent jet, boundary layer, skin friction, Stanton number

ABSTRACT: The conservation law of wall turbulence relative to changes in boundary conditions was used to investigate the interaction between a submerged turbulent jet with a solid wall. The schematic of the flow is shown in Fig. 1 on the Enclosure. A momentum integral method is used to obtain the momentum conservation equation

$$\frac{dR^{**}}{dX}+\left[1+\frac{\delta^*}{\delta^{**}}-\frac{\delta_1}{\delta^{**}}\right]\frac{R^{**}}{W_0}\frac{dW_0}{dX}=\frac{C_f}{2}R_sW_0,$$

where

$$R^{**}=\frac{w_0\delta^{**}}{\nu_s},\quad X=\frac{x}{s},\quad W_0=\frac{w_0}{w_s},\quad \frac{C_f}{2}=\frac{\tau_w}{\rho_0 w_0^2},\quad R_s=\frac{w_s s}{\nu_0},$$

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L 52160-65
ACCESSION NR: AP5013370

and the velocity profile is determined from the one-seventh power law. An expression is derived for the skin friction coefficient $C_f$ and, after a correlation with experimental data it is reduced to the form

$$\frac{C_{f1}}{2} = \frac{0.0314}{R_t^{0.2} X^{0.11}}.$$

Using this expression in the definition of the Stanton number, two equations are obtained for the nondimensional heat transfer coefficient which, for the submerged wall jet, is given by

$$N_x = \frac{\alpha x}{\lambda} = 0.1197 \left(\frac{w_t x}{\nu_t}\right)^{0.8} X^{-0.4} P^{0.6}$$

and for the wall jet with a weak wake by

$$\frac{(\rho w)_t}{(\rho w)_\infty} > 3, \qquad S_t = \frac{0.113}{R_t^{0.2} X^{0.44} P^{0.6}}.$$

This latter equation is shown to coincide with the results of M. Jakob, R. Rose, and M. Spielman (Heat Transfer From an Air Jet to a Plane Plate With Entrainment of Water Vapor From the Environment. Trans. ASME, 1950, vol. 72, No. 6) for Pr = 0.71. Orig. art. has: 23 equations and 4 figures.

ASSOCIATION: none

Card 2/4

L 52160-65

ACCESSION NR: AP5013370

SUBMITTED: 14Aug64 ENCL: 01 SUB CODE: ME

NO REF SOV: 005 OTHER: 006

Card 3/4

L 41774-65 EWT(1)/EPF(c)/EPF(n)-2/EWG(m)/EPR Pr-4/Ps-4/Pu-4 WW

ACCESSION NR: AP5005758 S/0170/65/008/001/0007/0010

39

AUTHOR: Kutateladze, S. S.; Leont'yev, A. I.; Kirdyashkin, A. G. 38

B

TITLE: Contribution to the theory of heat exchange 21 in nucleate boiling

SOURCE: Inzhenerno-fizicheskiy zhurnal, v. 8, no. 1, 1965, 7-10

TOPIC TAGS: nucleate boiling, heat exchange, Reynolds number, Prandtl number, Nusselt number, boundary layer

ABSTRACT: It is shown first that in the case of nucleate boiling, the ratio of the thickness of the boundary layer in the liquid to the average linear dimension of the quadratic cell per effective steam formation center is quite small, so that boundary-layer theory can be applied to the heat exchange processes occurring in nucleate boiling. It is also shown that the heat transfer to the liquid can be regarded as occurring in the vicinity of the frontal point. Using the boundary-layer theory and the laws of free turbulence, the authors derive the following relation for the ratio of the Nusselt to the Reynolds number

$$Nu_*/Re_* = c_1^4 + c_2 Re_*.$$

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L 41774-65
ACCESSION NR: AP5005758

and show by plotting this formula and the available experimental data, as well as by plotting the experimental data against the theoretical curve

$$Nu_* = c Pr^{1/3} Re_*^n,$$

that the extension of the boundary-layer theory to nucleate boiling is valid. They also conclude that the boundary-layer theory can serve as a basis for a more detailed theory of heat exchange during boiling. Orig. art. has: 3 figures and 9 formulas.

ASSOCIATION: Institut teplofiziki SO AN SSSR, Novosibirsk (Institute of Thermophysics, SO AN SSSR)

SUBMITTED: 29Apr64 ENCL: 00 SUB CODE: NP, ME

NR REF SOV: 004 OTHER: 003

am
Card 2/2

L 15273-66 EWT(m)/EWP(j) WW/RM
ACC NR: AP5028621 SOURCE CODE: UR/0030/65/000/010/0025/0031

AUTHOR: Kutateladze, S. S. (Doctor of technical sciences); Rozenfel'd, L. M. (Doctor of technical sciences)

ORG: none

TITLE: Problems in geothermal power engineering

SOURCE: AN SSSR. Vestnik, no. 10, 1965, 25-31

TOPIC TAGS: electric power production, heat energy conversion, heat pump, heat exchanger

ABSTRACT: The authors discuss the various thermal power resources hidden deep within the earth which show up as volcanic eruptions, geysers and hot springs. A design is proposed for a heat pump which uses the thermal power of underground springs. Water is pumped from a well into a freon evaporator and cooled. The freon vapor is then compressed and condensed under pressure. The heat from the compressed vapor is transferred to the water circulating in the heating system. This reduces energy losses by a factor of 4-6 in comparison with direct steam heating. The use of heat

Card 1/2 UDC: 525.215+620.04

2

L 15273-66
ACC NR: AP5028621

pumps for air conditioning units is discussed and the bromium-lithium absorption machine is recommended for temperatures above the freezing point of water, while the water-ammonium machine is recommended for temperatures below zero. The bromium-lithium absorption machine consists of two drums, a heat exchanger and pumps. The upper drum consists of a boiler and condenser, while the lower is made up of an absorber and an evaporator. The water from hot springs is fed to the boiler tube where the heat is used for boiling the water from an aqueous solution of lithium bromide. Tubes supplied with water from a cold spring are used for condensing the steam in the upper part of the drum. The condensed steam is cooled by a spray system in the lower drum and the water vapor is absorbed by a lithium bromide solution in the upper part of the drum. The lithium bromide is then fed through the heat exchanger to the boiler. The cold water is then used to absorb the heat from the ambient air. Methods are discussed for generating electricity by the use of subterranean heat sources. The capital outlay for geothermal electric power stations is high, however in certain regions they may be considerably more economic than conventional thermoelectric power stations. Orig. art. has: 4 figures.

SUB CODE: 10/ SUBM DATE: 00/ ORIG REF: 000/ OTH REF: 000

Card 2/2

L 24246-66 EWT(1)/EWP(e)/EWP(m)/EWT(m)/EWP(t)/EWP(k)/EWA(1) IJP(c) JD/WW/GS

ACC NR: AT6006920 SOURCE CODE: UR/0000/65/000/000/0351/0360

60

AUTHOR: Kutateladze, S. S.; Leont'yev, A. I. B+1

ORG: Institute of Thermophysics, Siberian Branch, AN SSSR, Novosibirsk (Institut teplofiziki, Sibirskoye otdeleniye AN SSSR)

16

TITLE: The turbulent boundary layer of a gas on a porous surface

SOURCE: Teplo- i massoperenos. t. II: Teplo- i massoperenos pri vzaimodeystvii tel s potokami zhidkostey i gazov (Heat and mass transfer. v. 2.: Heat and mass transfer in the interaction of bodies with liquid and gas flows). Minsk, Nauka i tekhnika, 1965, 351-360

TOPIC TAGS: turbulent boundary layer, gas dynamics, Mach number, surface property

ABSTRACT: If the effect of thermo-, baro-, and dino-diffusion are neglected, then the system of differential equations for a binary boundary layer assumes the form:

2

Card 1/2

L 24246-66

ACC NR: AT6006920

$$-\frac{dP}{dx}+\frac{\partial\tau}{\partial y}=\rho w_x\frac{\partial w_x}{\partial x}+\rho w_y\frac{\partial w_x}{\partial y};$$

$$\frac{\partial(\rho w_x)}{\partial x}+\frac{\partial(\rho w_y)}{\partial y}=0;$$

$$\mu\left(\frac{\partial w_x}{\partial y}\right)^2+w_x\frac{\partial P}{\partial x}-\frac{\partial q^*}{\partial y}=\rho w_x\frac{\partial i}{\partial x}+\rho w_y\frac{\partial i}{\partial y};$$

$$\frac{\partial}{\partial y}\left(D\rho\frac{\partial\bar{\rho}'}{\partial y}\right)=w_x\frac{\partial\bar{\rho}'}{\partial x}+w_y\frac{\partial\bar{\rho}'}{\partial y}.$$

On the basis of the above initial equations, the author develops a mathematical solution of the problem, taking into account the permeability of the surface, for blowing and suction over a wide range of Mach numbers. The results are compared with several series of data from the literature, and are exhibited graphically. Orig. art. has: 46 formulas and 5 figures.

SUB CODE: 20/ SUBM DATE: 09Nov65/ ORIG REF: 002/ OTH REF: 006

Card 2/2 dda

L 05525-67 EWT(1)/EWP(m) WW

ACC NR: AP6021363 SOURCE CODE: UR/0207/66/000/003/0149/0153

AUTHOR: Volchkov, E. P. (Novosibirsk); Kutateladze, S. S. (Novosibirsk); Levchenko, V. Ya. (Novosibirsk); Leont'yev, A. I. (Novosibirsk)

38

ORG: none

TITLE: Baffle cooling in the case of a current blowing into a turbulent boundary layer through multi-aperture and grid grates

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 3, 1966, 149-153

TOPIC TAGS: turbulent flow, boundary layer, cooled boundary layer

ABSTRACT: An analytic method is proposed for determining the effectiveness of baffle cooling of a plane thermally insulated wall when a cooling gas is delivered through grates. Results obtained for the cooling effect of a gas passing through a single aperture are shown to be applicable to the more complex problem. Equations for the degree of energy and momentum loss are introduced for the second aperture as an extension of those for the first. An estimate is then made of the effectiveness of heat protection, the measure of which is taken to be the temperature of the insulated wall. These estimates are shown to agree with experimental data. Orig. art. has: 23 formulas, 6 figures.

SUB CODE: 13/ SUBM DATE: 21Apr65/ ORIG REF: 006/ OTH REF: 002

Card 1/1 nst

ACC NR: AP7000058 SOURCE CODE: UR/0207/66/000/005/0123/0125

AUTHOR: Kutateladze, S. S. (Novosibirsk); Leont'yev, A. I. (Novosibirsk); Mironov, B. P. (Novosibirsk)

ORG: none

TITLE: Calculation of turbulent heat transfer on a semipermeable surface with injection of foreign gas

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no.5,1966, 123-125

TOPIC TAGS: turbulent heat transfer, semipermeable surface, sweat cooling, subsonic flow

ABSTRACT: A method is presented for calculating the heat transfer on a semipermeable surface under conditions of subsonic flow with foreign gas injection. The method is based on the solution of the energy equation and the use of the asymptotic theory of the turbulent boundary layer. Figure 1 shows the comparison of the calculated results with experimental data obtained by Tefik, Eckert, et al. (Thermal diffusion effects on energy transfer in turbulent boundary layer with helium injection. Proc. of the 1962 heat transfer and fluid. Mechanics Institute, Stanford University Press, 1962).



APPROVED FOR RELEASE: 03/13/2001 CIA-RDP86-00513R000927910014-8"

ACC NR: AP7000058

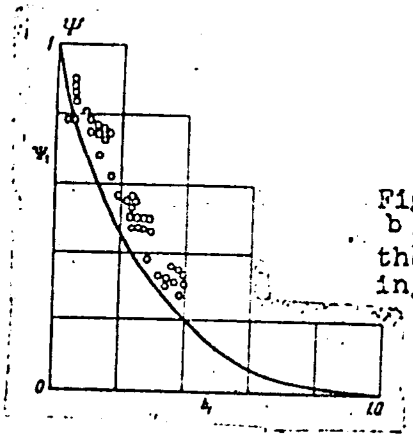


Fig.1. Variation of $\psi_1$ with $b_1$ ($\psi_1$, - function of the Stanton numbers; $b_1$ - injection parameter.

Figure 2 shows the rate of gas injection for the case where $c_p$ is different for the injected and main gases.

Card 2/3

ACC NR: AP7000058

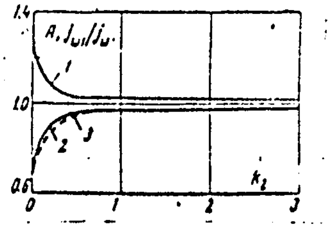


Fig.2. Variation of $j_{w1}/j_w$ with $k_2$. ($j_w$- rate of gas injection)

The calculation was performed for: $k_2$=0.005--6.0; R=0.25; $c_{p_1}/c_{p_0}$= 0.25; $\gamma$=0.303--0.9, where $k_2$ is a function of the wall and gas temperatures, and $c_{p_0}$ and $c_{p_1}$ are the specific heats of the main and injected gases, respectively. The obtained results show that the rate of injected gas is only slightly affected by the physical properties of injected and main gases.
Orig.art.has: 2 figures and 20 formulas. [WA-88]

SUB CODE: 21/ SUBM DATE: 06Aug65/ ORIG REF: 001/ OTH REF: 001

Card 3/3

ACC NR: AT6033956

SOURCE CODE: UR/0294/66/004/005/0698/0702

AUTHOR: Kutateladze, S. S.; Leont'yev, A. I.; Pimenov, A. K.

ORG: Institute of Thermophysics, Siberian Department, Academy of Sciences, SSSR (Institut teplofiziki Sibirskogo otdeleniya Akademii nauk SSSR)

TITLE: Contribution to the calculation of heat exchange in turbulent flow of gas in a long cylindrical channel for arbitrary distribution of the heat load and for essentially nonisothermal conditions

SOURCE: Teplofizika vysokikh temperatur, v. 4, no. 5, 1966, 698-702

TOPIC TAGS: gas flow, turbulent flow, Reynolds number, boundary layer heat transfer

ABSTRACT: This is a continuation of earlier work (Turbulentnyy pogranichnyy sloy szhimayevogo gaza [Turbulent Boundary Layer of a Compressible Gas], Izd-vo SO AN SSSR and earlier papers), where some difficulties arising in the traditional criterial reduction of experimental data on transfer in the initial section of a cylindrical tube were pointed out, and where ways of getting around these difficulties were indicated. The method proposed there, based essentially on initially representing the experimental data in the form of a functional relation between the Stanton number and the characteristic Reynolds number of the boundary layer, is employed in the present paper to study the turbulent flow of gas in a long cylindrical channel for arbitrary distribution of the heat load. The wall temperature is calculated on the basis of the analogy between the external and internal problem and on the basis of the conservative

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UDC: 536.24.01: 532.542

ACC NR: AP5033956

nature of the law of heat exchange relative to variation of the boundary conditions. The influence of the non-isothermal conditions on heat exchange in the turbulent boundary layer is estimated in accordance with a limiting theory likewise described in the earlier paper. It is assumed that the distribution of the velocities and of the temperature is conservative with respect to the influence of the non-isothermal conditions. It is concluded that the results of the calculations can explain many of the published experimental data. Orig. art. has: 2 figures and 13 formulas.

SUB CODE: 20/ SUBM DATE: 01Dec64/ ORIG REF: 008/ OTH REF: 001

Card 2/2

ABULADZE, A.S., prof.; PAYLODZE, Yu.B., prof.; KUTATELADZE, Ye.A., dotsent;
ANTELEVA, A.V., assistent; GLONTI, L.V., assistent

Fluorine content of food products and drinking water in the Georgian S.S.R. Gig.i san. 24 no.11:71 N '59. (MIRA 13:4)

1. Iz kafedry biokhimii Tbilisskogo meditsinskogo instituta.
(WATER SUPPLY)
(FOOD)

L 17689-66 EWT(1)/EWA(h)
ACC NR: AP6006335 SOURCE CODE: UR/0413/66/000/002/0058/0058

INVENTOR: Korotkov, V. P.; Kudryashov, A. N.; Kutavenko, S. S.; Polovoy, P. A. 24

B

ORG: none

TITLE: Contactless time relay 25 Class 21, No. 177986

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 2, 1966, 58

TOPIC TAGS: time relay, delay circuit

ABSTRACT: The contactless time relay shown in Fig. 1 consists of RC networks, blocking generators, and flip-flops. To increase the time delay and simplify the

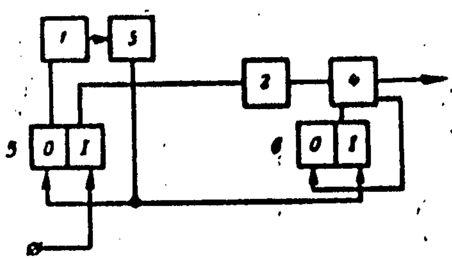


Fig. 1. Time relay

1-4 - Coupled blocking generators;
5, 6 - flip-flops.

Card 1/2 UDC: 621.318.57

L 17689-66

ACC NR: AP6006335

circuitry, one of the flip-flop outputs drives blocking generator 1 and the other complementary output drives blocking generator 2. The output of the third blocking generator driven by the first is connected to the 0 input of the first flip-flop (5) and the 1 input of flip-flop 6. The 0 input of flip-flop 6 is connected to the output of blocking generator 4. Orig. art. has: 1 figure. [BD]

SUB CODE: 09/ SUBM DATE: 08Jul64/ ATD PRESS: 4209

Card 2/2

KUTAY, A. K.

Candidate of Technical Sciences

"Tolerances for Special Gages." Stanki I Instrument Vol. 15, No. 10-11, 1944

BR 52059019

KUTAY, A. K.

Proizvodstvennyi kontrol' razmerov mashinnostroitel'nykh detalei. Leningrad, Mashgiz, 1947. 297 p. diagrs.

Bibliography: p. 293-296.

Industrial control of dimensions of machine-building parts.



SO: Manufacturing and Mechanical Engineering in the Soviet Union, Library of Congress, 1953.

KUTAY, A. K.

25574. KUTAY, A. K.
Metody analiza tochnosti tekhnologicheskikh protsessov. (Voprosy Tekhn. Obrabotki). V sb: Nekotoryye voprosy tekhnologii mashinostroeniya. M.-L., 1948, s. 67-84.

SO: Letopis' Zhurnal Statey, No. 30, Moscow, 1948

KUTAY, A. K.

Vzaimozamenyaemost' i kontrol' v mashinostroenii. (LONITOMASH, kn.20.) Leningrad, Mashgiz, 1950. 264 p.

Interchangeability and control in mechanical engineering.

SO: Manufacturing and Mechanical Engineering in the Soviet Union, Library of Congress, 1953.

GOBERMAN, P.N.; KUTAY, A.K., kandidat tekhnicheskikh nauk, dotsent, redaktor; SOKOLOVA, L.V., tekhnicheskiy redaktor.

[The screwing together of screw-threads with protective coatings] Svinchivaemost' rez'b s zashchitnymi pokrytiiami. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1954. 74 p.(MLRA 8:2)
(Screw-threads)

MYAGKOV, V.D.; KUTAY, A.K., kandidat tekhnicheskikh nauk, retsenzent; BOYTSOV, A.N., kandidat tekhnicheskikh nauk, redaktor; DLUGO-KANSKAYA, Ye.A., tekhnicheskiy redaktor.

[Tolerance and fit; handbook] Dopuski i pasadki; spravochnik. 2-e izd., perer. i dop. Moskva, Gos. nauchno-tekhn. izd-vo mashino-stroit. i sudostroit. lit-ry, 1954. 367 p. (MLRA 7:10)
(Tolerance (Engineering)) (Machine-shop practice)

KUTAY, A.K.

Investigating the accuracy of the geometric parameters of motion--picture films. Trudy LIKI no.3:131-140 '55. (MLRA 9:8)

1. Kafedra tekhnologii tochnogo mashinostroyeniya.
(Cinematography--Films)